PROVINCE OF ALBERTA

HIGH SCHOOL AND UNIVERSITY
MATRICULATION EXAMINATIONS BOARD.

DEPARTMENTAL EXAMINATIONS, 1928.

CHEMISTRY 1.

Time—Three hours.

Values.

4 **1.** (*a*) State *four* examples of the application of chemistry to manufacturing or to any other branch of industry.

4 (*b*) Classify the following changes as to whether they are physical or chemical:

(1) Warm milk is cooled.

(2) Sparks fly from red-hot iron when it is hammered.

(3) An electric current is passed through a copper wire.

(4) Limestone is heated in a lime-kiln.

6 **2.** (*a*) Describe experiments showing the composition of water (1) by analysis (2) by synthesis.

4 (*b*) Distinguish between a mechanical mixture and a chemical compound giving an example of *each*.

6 **3.** (*a*) (1) A small quantity of mercury is gradually heated in a retort to which air is admitted, until it is entirely converted into a new substance.

(2) This new substance is then placed in a hard glass test tube and strongly heated.

State the changes which take place in each of the experiments in (1) and (2). Name the resulting substances in each case.

2 (*b*) Write the equation expressing the reaction when oxygen is prepared from manganese dioxide and potassium chlorate.

2 (*c*) State *two* important economic uses of oxygen.

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3 **4.** (*a*) Show, by description of an experiment, the approximate percentage volume of nitrogen in the atmosphere.

2 (*b*) State clearly what is meant by a pure substance.

4 (*c*) Describe an experiment to illustrate the law of conservation of weight.

5 **5.** (*a*) In the preparation of hydrogen from zinc and sulphuric acid, how many grams of the acid are necessary to produce 340 litres of the gas measured at standard temperature and pressure?

$H = 1, \quad S = 32, \quad O = 16.$

4 (*b*) A compound on analysis yields 64.86% of carbon, 13.51% of hydrogen, and 21.62% of oxygen. Find a molecular formula for the compound.

$C = 12, \quad H = 1, \quad O = 16.$

4 **6.** (*a*) State *two* important facts expressed by the equation $2H_2 + O_2 = 2H_2O$.

9 (*b*) Write molecular formulæ for:

(1) the oxide of calcium, of potassium and of zinc.

(2) the sulphide of lead, of iron and of sodium.

(3) the nitrate of magnesium, of ammonium and of hydrogen.

1 **7.** (*a*) Define a chemical radicle.

6 (*b*) Write formulæ for the radicles of nitrous acid, sulphuric acid, phosphoric acid, carbonic acid, nitric acid and ammonium chloride.

3 (*c*) Give the valency of *each* of the radicles asked for in (*b*).

5 **8.** (*a*) Give a brief description of the commercial method of making wood charcoal.

2 (*b*) State *two* economic uses of charcoal.

2 (*c*) Write an equation expressing the reaction when powdered charcoal and copper oxide are mixed in a hard glass test tube and heated.

3 **9.** (*a*) Describe the process of making acetylene.

2 (*b*) State *two* economic uses of acetylene.

6 (*c*) Write equations for the reactions which take place in the following experiments:

(1) Steam is passed over red-hot coal.

Values.

(2) Sodium carbonate is added to water which is hard due to the presence of magnesium chloride.

(3) Sulphur dioxide is passed into a solution of sodium hydroxide.

5 **10.** *Either* (*a*) Describe, using a diagram, the commercial mining of salt in Canada.

2 (*b*) Write an equation expressing the reaction when sulphuric acid is added to common salt.

4 (*c*) Prove by description of an experiment that hydrogen chloride contains chlorine.

5 *Or* (*a*) Briefly describe the contact method of making sulphuric acid.

2 (*b*) Describe a suitable test for sulphuric acid.

4 (*c*) State *four* important economic uses of sulphuric acid.

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$C + 2CuO \rightarrow CO_2 + 2Cu$

$Na_2CO_3 + MgCl_2 \rightarrow MgCO_3 + 2NaCl$

$SO_2 + NaOH \rightarrow$

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QUAECUMQUE VERA